

PATENT SPECIFICATION



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COMPLETE SPECIFICATION.

Improvements in and relating to the Manufacture of Intaglio Printing Rollers or Cylinders.

We, LANGBEIN - PRANHAUSER - WERKE
ARTFABRIKGESELLSCHAFT, a German Com-
pany, of 76, Torgauer Strasse, Leipzig
0.28, Germany, do hereby declare the
nature of this invention and in what
manner the same is to be performed, to
be particularly described and ascertained
in and by the following statement:—

This invention relates to the manufac-
ture of intaglio printing rollers or
cylinders having on the permanent sur-
face of the cylinder a thin copper layer,
sufficient for one etching, which is
mechanically strippable from such
surface.

In the processes hitherto known for the
manufacture of such intaglio printing
rollers or cylinders, the mechanical
separability from the cylinder of the
copper layer was attained by the provision
of a special intermediate layer, so that
the copper would not permanently adhere
to the cylinder. A metallic alloy of low
melting point or a coating of grease, or
of graphite or the like was employed as
such an intermediate layer. In contra-
distinction to this, the present invention
has for its object to enable the metallic
layer serving for the etching and printing
to be stripped from the cylinder in another
and simpler manner.

The process according to the present
invention consists in depositing upon the
cylinder the smooth surface of which con-
sists of nickel, cobalt or alloys thereof
with or without iron or copper or the like
a layer of copper of which the portion
first applied is of such different texture
or structure from that ordinarily produced
by electro-deposition that it is less
strongly adherent than the remainder of
the layer which is thereafter applied by
known methods of electro-deposition.

One method of carrying out the process
of the invention consists in producing an
initial very thin layer of copper by
electro-deposition under abnormal condi-
tions so that the layer is not strongly
adherent to the surface of the roller or
cylinder and thereafter increasing the
layer to the desired thickness by a normal
electro-plating operation. It will be
apparent that the normal conditions of

electro-plating are conducive to the pro-
duction of adherent coatings. The
departure from the normal conditions of
deposition may consist, for example, in
producing the initial very thin layer of
copper from a potassium cyanide copper
bath which contains little or no cyanide
not in the form of complex metal salts.
The layer is thereupon increased or
thickened in a normal acid copper electro-
plating bath until a thickness of about
0.10 to 0.15 mm. is obtained, which
suffices for one etching. The copper
deposit obtained in this way can be com-
pletely removed from the smooth,
permanent surface of the cylinder in a
purely mechanical manner by stripping
off or unrolling, without detrimentally
affecting the smooth surface of the
cylinder.

In carrying this invention out in
practice a potassium cyanide copper bath
may be employed which contains about 75
to 100 grams of pure crystalline copper
potassium cyanide and 20 grams of caustic
soda per litre. So long as this bath liquor
is not coloured blue, and thus contains
no uncombined copper cyanide, it must
be heated with 3 to 5 grams of copper
cyanide per litre which combines with the
free potassium cyanide forming copper
potassium cyanide. In this electrolyte a
carefully polished and degreased nickel
coated cylinder is copper plated by rotat-
ing it for 1 or 2 minutes under a current
density of about 0.3 to 0.5 amps. per
square decimetre. Afterwards the cylinder
is plated in a normal copper plating bath
while being rotated, with or without
simultaneous polishing by agate, until the
necessary thickness of copper layer for
etching has been produced. In this case
a normal acid copper bath can be used
which contains e.g. 220 grams of copper
sulphate and 15 grams of sulphuric acid
per litre. The current density may be 3
to 10 amps per square decimetre.

The invention includes an intaglio
printing roller or cylinder having thereon
a copper layer rendered mechanically
strippable by having the portion adjacent
to the smooth surface of the roller or
cylinder of said different texture or

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structure from that of the remainder that it is less strongly adherent to such surface than the coatings ordinarily produced by electro-deposition.

5 A particularly simple and advantageous mode of carrying out the process of the present invention consists in employing the cylinder, the smooth surface of which is formed, for example, of polished nickel, 10 first for a short time as the anode, whilst continuously rotating it, in a normal acid copper electro-plating bath, and then coating it by electro-deposition in known manner until the desired thickness of 15 copper has been obtained. This may be accomplished simply by reversing the current so that the cylinder becomes the cathode. In this case the whole operation can be carried out in a single electro- 20 plating bath. The portion of the copper layer adjacent to the smooth surface of the roller or cylinder is of such different texture or structure that the layer is less strongly adherent than the coatings 25 ordinarily produced by electro-deposition. This probably results from passivation of the surface of the cylinder or from the liberation of oxygen at this surface during the anodic treatment. The outer part of 30 the layer, however, is of the texture or structure usually desired for etching and printing.

If it is desired to perform the electro-deposition at a higher temperature, such 35 as between 30 and 50° C., as is usual in practice for speedier results, it is advisable, in order to prevent a possible anodic action on the permanent surface of the cylinder by the sulphuric acid ions, to 40 add to the bath chromium salts or similarly acting substances which promote the passivation of the cylinder surface.

In this case about 2 to 10 grams of 45 chromium sulphate per litre may be added to a normal acid copper plating bath which contains, for example, 220 grams of copper sulphate and 15 grams of sulphuric acid per litre. The cylinder with a care- 50 fully polished and degreased nickel coating is put in the copper bath and connected up as the anode for about 30 seconds at a current density of 5 amps. per square decimetre while being continu- 55 ously rotated. Then the current is reversed and the normal copper plating commenced. The copper deposits first in brown colour by which the difference in structure or texture of the copper by the 60 anodic passivation of the nickel surface is visibly evident. The brown colour rapidly changes over to the usual light yellow colour of the copper. The time of copper coating is about 2 to 8 hours 65 according to whether the cylinder is

wholly or partly immersed in the electrolyte. The current density is about 5 to 10 amps. per square decimetre.

The body of the cylinder or roller will usually consist of iron or steel or other strong material, such as aluminium, brass, 70 copper, bronze or the like for reasons of economy, and its casing or outer surface consists of nickel or cobalt or an alloy of nickel and cobalt or an alloy of these two 75 metals with iron or copper and the like. If after long use any destruction of the permanent surface of the cylinder takes place, which however generally only happens when many copper layers have 80 been applied and again removed, the cylinder casing or surface can be restored, in known manner, for example by electro-plating e.g. with nickel or by mechanical 85 plating or welding and by subsequent polishing.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, we declare that what we claim 90 is—

1. Process for the manufacture of intaglio printing rollers or cylinders formed of or coated with nickel or cobalt or an alloy of nickel and cobalt or an 95 alloy of these two metals with iron or copper or the like, having thereon a copper etching layer mechanically strippable and sufficient only for one etching, which consists in depositing upon the 100 smooth surface of the cylinder a layer of copper of which the portion first applied is of different texture or structure from the remainder of the layer which is thereafter applied by ordinarily produced 105 electro-deposition.

2. Process as claimed in claim 1 in which an initial very thin layer of copper is produced by deposition from a 110 potassium cyanide copper bath which contains little or no cyanide not in the form of complex metal salts and then a further coating of copper, completing the mechanically strippable layer to the desired thickness, is deposited thereon 115 from a customary copper electro-plating bath.

3. Process as claimed in claim 1 in which the cylinder is first employed for a short time as the anode in a customary 120 acid copper electro-plating bath while being continuously rotated and is then coated by electro-deposition in known manner until the desired thickness of copper has been deposited. 125

4. Process as claimed in claim 1 in which the cylinder is first employed for a short time as the anode in a customary acid copper electro-plating bath and is 130 then employed as the cathode in the same

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bath until the desired thickness of copper has been deposited.

5. Process as claimed in claims 3 or 4 in which chromium salts or similarly acting substances are added to the electroplating bath to promote passivation of the cylinder surface and prevent anodic attack of such surface.

6. An intaglio printing roller or cylinder, formed of or coated with nickel or cobalt or an alloy of nickel and cobalt or an alloy of these two metals with iron or copper or the like, having thereon a copper layer sufficient only for one etching and rendered mechanically strippable

by having the portion adjacent to the smooth surface of the roller or cylinder of different texture or structure from the portion completing the layer to the desired thickness which is applied by ordinarily produced electro-deposition.

7. Process for the manufacture of intaglio printing rollers or cylinders substantially as described.

8. Intaglio printing rollers or cylinders substantially as described.

Dated this 7th day of April, 1932.

W. P. THOMPSON & Co.,
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